

WHAT WE CLAIM ARE:

1. A semiconductor apparatus, comprising:
 - a support substrate having through holes filled with conductor in conformity with a first pitch,
 - 5 a capacitors formed on or above said support substrate,
 - a wiring layer formed on or above said support, leading some of said through holes filled with conductor upwards via said capacitor, having branches, and having wires of a second pitch different from said first pitch, and
 - 10 plural semiconductor elements disposed on or above said wiring layer, having terminals in conformity with the second pitch, and connected with said wiring layer via said terminals.
2. The semiconductor apparatus, according to claim 1, further comprising a circuit board having wiring of a first pitch and connected to lower surfaces of said through holes filled with conductor.
- 15 3. The semiconductor apparatus, according to claim 1, wherein said second pitch is narrower than said first pitch.
- 20 4. The semiconductor apparatus, according to claim 1, wherein said support substrate is a Si substrate having through holes with an insulation film formed on the side walls of the holes, and said through holes filled with conductor are metallic conductors packed in said through holes.
- 25 5. The semiconductor apparatus, according to claim 2, wherein said support substrate is a Si substrate having through holes with an insulation film formed on

the side walls of the holes, and said through holes filled with conductor are metallic conductors packed in said through holes.

6. The semiconductor apparatus, according to claim 4, wherein said insulation film is a silicon oxide film formed by thermal oxidation, and upper and lower surfaces of said silicon substrate are also covered with a silicon oxide film.

7. The semiconductor apparatus, according to claim 1, wherein said capacitor is a decoupling capacitor connected between power wires, and said wiring layer has branches between said decoupling capacitor and at least one of said semiconductor elements.

8. The semiconductor apparatus, according to claim 1, wherein said through holes filled with conductor include a first signal wire; said wiring layer contains a second signal wire for leading the first signal wire substantially vertically; and said capacitor has electrodes with a vacancy around a region where said second signal wire is located.

9. The semiconductor apparatus, according to claim 5, wherein said through holes filled with conductor include a first signal wire; said wiring layer contains a second signal wire for leading the first signal wire substantially vertically; and said capacitor has electrodes with a vacancy around a region where said second signal wire is located.

25 10. The semiconductor apparatus, according to claim 1, further comprising an insulation layer disposed on said support substrate, having a thermal expansion

coefficient of 10 ppm/ $^{\circ}$ C or less in the in-plane direction, and insulating said wiring layer and said capacitor.

11. The semiconductor apparatus, according to claim 1, wherein said capacitor
5 has a capacitor dielectric layer made of an oxide containing at least one of Ba, Sr
and Ti, and a pair of capacitor electrodes sandwiching the capacitor dielectric
layer and containing at least partially one of Pt, Ir, Ru, Pd or any of their oxides.

12. The semiconductor apparatus, according to claim 9, wherein said capacitor
10 has a capacitor dielectric layer made of an oxide containing at least one of Ba, Sr
and Ti, and a pair of capacitor electrodes sandwiching the capacitor dielectric
layer and containing at least partially one of Pt, Ir, Ru, Pd or any of their oxides.

13. The semiconductor apparatus, according to claim 1, wherein said wiring
15 layer contains a wiring connecting said plural semiconductor elements with each
other.

14. The semiconductor apparatus, according to claim 1, further comprising
another circuit part connected with said wiring layer.

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15. A process for producing a semiconductor apparatus, comprising the steps
of:

(a) forming through holes at a first pitch in a support substrate;
25 (b) forming an insulation layer on side walls of said through holes;
(c) filling through holes filled with conductor in the through holes
provided with said insulation film;

(d) forming a capacitor connected with at least some of said through holes
filled with conductor, and wires connected with said through conductor or said
capacitor and having a second pitch, on said support substrate, and
(e) connecting plural semiconductor elements having terminals in
5 conformity with said second pitch, with said wires.

16. The process for producing a semiconductor apparatus, according to claim
15, wherein said support substrate is a Si substrate;

said step (a) thermally oxidizes both surfaces of the Si substrate to form
10 silicon oxide films, and forms through holes passing from one of the silicon oxide
films through the silicon substrate to reach the other silicon oxide film;
said step (b) thermally oxidizes side walls of the through holes; and
said step (c) forms a seed layer on back surface of the other silicon oxide
film, and removes oxide films at bottoms of the through holes, to expose the seed
15 layer, and forms a plating layer in the through holes using said seed layer as seed.

17. The process for producing a semiconductor apparatus, according to claim
16, wherein said step (d) forms a lower electrode layer, patterns the lower
electrode layer to form signal wires and vacancies around them, forms an oxide
20 dielectric film covering the lower electrode, patterns the oxide dielectric film to
expose the signal wires and connecting portion of the lower electrode, forms an
upper electrode layer covering the oxide dielectric film, and patterns the upper
electrode layer to form signal wires, a wire connected with the lower electrode and
vacancies around the wires.

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18. The process for producing a semiconductor apparatus, according to claim

17, wherein said step (d) further alternately forms an insulation layer and a wiring layer to form a wiring layer adapted to a second pitch.

19. The process for producing a semiconductor apparatus, according to claim
5 18, wherein said step (d) forms a wiring layer containing wires connecting plural semiconductor elements with each other.

20. The process for producing a semiconductor apparatus, according to claim
15, further comprising the step of connecting said support substrate with a circuit
10 board having wires adapted to said first pitch.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100